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### (54) COUPON INSERTING APPARATUS AND METHOD.

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## Description

### Background Of The Invention

The present invention relates to apparatus and methods for inserting coupons into containers moving along a high volume handling system. In particular, the invention separates the forwardmost coupon from a continuous web and injects the coupon into a container as the container passes a designated location for insertion.

It is a common advertising and promotional technique to place coupons or other leaflets into containers, such as cartons for breakfast cereal or snack items, along with the product to be sold. The consumer may use the coupon for whatever purpose intended, such as for discount or future purchases or a rebate. Many devices have therefore been provided to deposit coupons into containers in the present day packaging industry.

This is just one use for the invention which will be described in detail hereinafter. However, it should be understood that the word "coupon" is used in its broadest possible sense to include any coupon, card, sheet, receipt, warranty, premium or other part that can advantageously be handled as described hereinafter. Similarly, "container" is used in the broadest possible sense to include containers such as boxes, tubs, cans and vessels of all kinds as well as any other coupon-receiver which can advantageously be used with this invention.

Typically, coupon inserting devices operate by discharging or positioning a single coupon in each of a plurality of containers which rapidly move along a conveyor system or similar material handling system. The containers are positioned in a particular relationship to the mechanism involved. Known inserting devices, while they perform satisfactorily under certain circumstances, are somewhat unreliable, inflexible and expensive to manufacture, set-up, operate and maintain.

Commonly, coupon dispensing systems require a stack of precut coupons that are individually dispensed from a downwardly sloping channel. One arrangement of this type is disclosed in U.S. Patent 4,530,200. In that system, a pusher element and advancing rollers coact to withdraw the forwardmost coupon from a precut stack of coupons. The coupon is thereby drawn into the downwardly sloping channel to the dispensing location. This arrangement, however, requires a separate cutting and stacking operation before the coupons are ready for the dispensing stage. Another arrangement providing a downwardly sloping tray is disclosed in U.S. Patent 4,179,113. In that system, a reciprocal vacuum head dispenses each coupon from a stack of precut coupons arranged on an inclined tray and places the coupons in a conveyor

system which transports the coupons to the containers.

Still other systems require mechanical cutting devices such as a scissors device to separate each coupon from a continuous web. Such an arrangement is disclosed in U.S. Patent 4,354,894. In that system, an advance drum draws the coupons away from the coupon web and toward a scissors device which separates the coupon web into individual coupons. The coupons are thereafter dispensed to moving packages with the use of a conveyor system.

While such prior art systems may function satisfactorily under certain conditions, they are quite complex, often requiring additional coupon processing stages. Such systems, moreover, are susceptible to jamming when operating at high rates of speed. As a result, a coupon may not be placed in every container. On the other hand, two or more coupons may be inadvertently inserted in one container. Moreover, many of the known coupon inserting systems are not capable of accommodating various spacing of the containers and varying conveyor speeds. Further, the known systems do not easily accommodate changes in the location of insertion or the size or shape of the container.

### OBJECTS OF THE INVENTION

Accordingly, a general object of the present invention is to provide an improved coupon inserting apparatus that overcomes the deficiencies of the prior art.

Similarly, an object of the present invention is to provide a coupon inserting apparatus that ascertains the location of each of a plurality of containers moving at varying speeds and positively places a coupon at that location at a predetermined time.

An additional object of the present invention is to provide a coupon inserting apparatus capable of detaching a single coupon from a continuous web at high speed and with precision and inserting it into a container.

It is another object of this invention to provide a new and unique method of storing a supply of coupons and efficiently and positively feeding them, one at a time, to a predetermined position at a predetermined time.

Finally, an object of the present invention is to provide a coupon inserting apparatus that may be portably and universally located to operate at varying points of insertion and along varying insertion paths to practice the unique method of this invention.

Other objects and advantages of the invention will become apparent upon reading the following description and appended claims, and upon refer-

ence to the accompanying drawings.

### SUMMARY OF THE INVENTION

The above objects are accomplished by providing a coupon inserting apparatus that operates on a continuous web of separable coupons. The apparatus separates the forwardmost coupon from a continuous web in a controlled intermittent operation. Successive coupons are connected to each other by spaced-apart weakened portions, such as by perforations, extending transversely of the web. The forwardmost coupon is separated and inserted by rotating downstream rolls which function as a burster to apply separating tension to the coupon. After separating the forwardmost coupon, the coupon inserting apparatus directs the coupon into a container which may be rapidly moving.

The coupon inserting apparatus comprises support means, positioning roll means to separate the forwardmost coupon from the continuous web and dispense the coupon at a predetermined location, and feed roll means to intermittently advance the continuous web toward the positioning roll means. The positioning roll means includes a pair of spaced rolls rotatably mounted relative to the support means and defining a bight to receive the leading edge of the forwardmost coupon. In addition, positioning drive means continuously actuates the positioning roll means to move the forwardmost coupon at a predetermined speed.

The feed roll means includes a pair of spaced rolls located upstream from the positioning roll means by a distance in excess of one coupon length. The feed roll means are oriented to direct the leading edge of the forwardmost coupon into the bight formed by the positioning roll means. Feed drive means intermittently drives the feed roll means and advances the leading edge of the forwardmost coupon toward the bight formed by the positioning roll means. The feed drive means operates at a speed substantially less than the predetermined speed of the positioning roll means so that, upon receipt of the leading edge of the forwardmost coupon, the forwardmost coupon is separated from the next coupon along the weakened web portion separating the coupons.

A specific feature of the present invention utilizes control means to actuate and deactuate the feed drive means. The control means includes timing means and detects the position of a moving target or container. The timing means of the control means determines a predetermined time for the container to reach the point of insertion. The control means also receives information from coupon sensing means located at a coupon sensing position between the positioning roll means and the feed roll means. The coupon sensing means de-

etects the presence of and the absence of a coupon at the coupon sensing position. The control means actuates the feed drive means at the predetermined time and upon sensing of the forwardmost coupon at the sensing location to draw the forwardmost coupon into the bight formed by the positioning means, thereby bursting the forwardmost coupon from the continuous web. The positioning roll means moves the coupon toward the predetermined location of insertion at the predetermined speed. When the forwardmost coupon has exited the coupon sensing position, the coupon sensing means detects absence of the coupon. The control means deactuates the feed drive means upon the sequential sensing of the absence of the forwardmost coupon and the sensing of the next coupon at the coupon sensing position. The inserting apparatus may thereby accomplish feeding of coupons to containers moving at varying rates of speed.

Another particular feature of the present invention is provided by a coupon web supply means that supplies the continuous web of coupons to the feeding roll means. The coupon web supply means includes a flexible feeding chute having an output end that is fixed relative to the support means with an input end and a body that may be flexibly and tortuously positioned relative thereto. The support means of the coupon inserting apparatus is mounted by universal means for angularly positioning the coupon inserting apparatus about a joint. The supply means may include source means feeding the input end of the flexible chute. The source means may include means for storing a roll of preformed coupons in continuous web form, and associated dispensing rollers and the like. The source means may also comprise a storage means for a fan-folded web of coupons and associated dispensing mechanisms. Still another source means may include a source roll of unfolded coupons which make up the web, either pre-perforated or not. In that system, folding rolls and a perforating mechanism, if required, receive the web from the source roll and the folded and perforated web is fed through a take-up means to the input end of the flexible chute. Thus, the coupon inserting apparatus may be positioned to provide insertion of the coupons at varying points of insertion and from various sources.

### BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of one embodiment of the coupon inserting apparatus of the present invention oriented relative to a conveying system, with part of the apparatus removed for clarity.

Fig. 2 is a simplified block diagram representation of the coupon inserting apparatus of Fig. 1.

Fig. 3 is a perspective view of the inserting head of the coupon inserting apparatus of Fig. 1.

Fig. 4 is an elevational view of the inserting head with a part of the apparatus removed.

Fig. 5 is a detailed perspective view of a mounting arrangement for the coupon inserting apparatus of Fig. 1 viewed from the bottom of the inserting head.

Fig. 6 is a sectional view of a coupon inserting apparatus illustrating the vertical adjustability thereof.

Fig. 7 is a plan view of a coupon inserting apparatus illustrating the horizontal adjustability thereof.

Fig. 8 is a flow diagram of the coupon and package processing steps in accord with the coupon inserting apparatus and method of the present invention.

Fig. 9 is a highly simplified perspective view of the coupon inserting apparatus of the present invention.

Fig. 10 is a diagrammatic representation of the coupon inserting apparatus of the present invention.

Fig. 11 is a diagrammatic representation of the coupon inserting apparatus including a fanfold supply means.

Fig. 12 is a diagrammatic representation of the invention using a fabricating supply means.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The following detailed description will permit a more complete understanding of this invention. However, the embodiments described below are simply examples of the invention and the invention is not limited to these embodiments. Furthermore, the drawings are not necessarily to scale and certain elements may be illustrated by graphic symbols and fragmentary views. In certain instances, details may have been omitted which are not necessary for an understanding of the present invention, including conventional details of fabrication and assembly.

Generally, the present invention relates to an apparatus and method for receiving a continuous web of coupons, pulling the forwardmost coupon away from the continuous web, and dispensing the coupon at a predetermined time into a rapidly moving container as it passes a predetermined location. The device of this invention is intended to be integrated into a full service container processing system, and will supply coupons into the containers at a location at which the containers have been formed, usually have not yet been filled and have not yet been closed.

Turning to the drawings, Fig. 1 shows a perspective view of the coupon inserting system of the present invention including apparatus 5. Coupon inserting apparatus 5 includes an adjustable inserting head 8 which is positioned relative to a conveyor system 11 that transports a plurality of containers 10. The adjustable inserting head 8 is secured to a universal mounting joint 92 at the distal end of a support arm 94. A mounting shaft 94 is secured to a column 6 with use of a rotary joint 7 and securing means 13. The mounting post 6 is supported on a base 14 and also supports an electronic controller 70 which provides logical control for the coupon inserting head 8. It is desired that electronic controller 70 is enclosed in a cabinet suitable for the industrial environment.

Fig. 1 also shows a coupon reel 9 rotatably mounted on an axle which is secured to post 6. Coupon reel 9 provides a housing for a stream of coupons arranged in a continuous web 46 of a type which are to be processed for ultimate insertion into the containers 10. The first coupon in the series, forwardmost coupon 20, is succeeded by the next coupon 22. The coupons are spaced apart and connected by weakened portions extending substantially transversely of the web. Weakening can be accomplished by a line of perforations. A perforated line connects the trailing edge of forwardmost coupon 20 and the leading edge of coupon 22, extending transversely of the continuous web 46. The succeeding coupons are arranged in a similar manner. In the preferred embodiment, the coupons are about the size of a dollar bill, folded along transverse lines of the coupon which extend longitudinally in the web. This configuration permits easy insertion by coupon inserting head 8.

The adjustable inserting head 8 includes positioning roll means shown as a pair of spaced positioning rolls 48 and 50. Positioning rolls 48 and 50 are driven at a predetermined rotational speed by positioning drive means shown as stepper drive motor 58. A servo motor may also be used resulting in higher speed operation and concomitant higher cost. Adjustable inserting head 8 also includes feed roll means shown as a pair of spaced feed rolls 36 and 38 which are located upstream from positioning rolls 48 and 50. Feed rolls 36 and 38 are intermittently driven at a lower rotational speed than the positioning rolls 48 and 50 by feed drive means shown as stepper drive motor 56. Feed rolls 36 and 38 draw the web of coupons 46 through a flexible feed chute 88 and toward the bight formed by positioning rolls 48 and 50.

At a predetermined time, feed rolls 36 and 38 cause the leading edge of the forwardmost coupon 20 to enter the bight 49 between positioning rolls 48 and 50. Positioning rolls 48 and 50 tear the forwardmost coupon 20 from the next succeeding

coupon 22 along the perforated line of separation and inject forwardmost coupon 20 at a predetermined location. A photoelectric coupon sensor 62 is also shown disposed between feed rolls 36 and 38 and positioning rolls 48 and 50 to provide electronic controller 70 with sensed coupon location information.

Coupon inserting head 8 is placed relative to a conveyor system 11 that transports containers such as boxes or cartons to successive container processing stations. Conveyor system 11 includes a conveyor belt 12 which rests on support rollers, one such roller being shown as roller 14. A plurality of containers such as container 10 travel on conveyor belt 12 in the direction designated by arrow 15. For maximum production, conveyor belt 12 transports the containers at a high rate of speed.

A pair of photoelectric sensors 24 and 26 are placed relative to the conveyor system 11 and provide electronic controller 70 with timing information related to container position and motion. Electronic controller 70 processes the timing information and the coupon sensor information and actuates and deactuates the feed drive means in accordance therewith. The coupons are thereby inserted, one at a time, into the containers as the containers pass coupon inserting head 8.

Referring now to Fig. 2, it is a block diagram of the operation of the coupon inserting apparatus of the present invention. The electronic controller 70 receives information from a coupon sensor 62 related to the presence and absence of a coupon at a sensing point between the pair of feed rolls 36, 38 and the pair of positioning rolls 48, 50. The coupon position signal received by controller 70 is designated by a line 120. The electronic controller 70 also receives information related to the position of the forwardmost container designated by a line 122. The controller 70 is preferably microprocessor controlled and may actually be a personal computer. It operates in a logical fashion to provide actuating and deactuating signals on a line 124 to a first stepper motor controller 126. The stepper motor controller 126 provides a controlled pulse train represented by a line 128 to control the feed roll drive means; in this embodiment, stepper motor 56. Stepper motor 56 actuates and deactuates feeding rolls 36 and 38 in response to commands provided by controller 70.

Similarly, electronic controller 70 may provide actuating and deactuating signals represented by a line 130 to a second stepper motor controller 132. Stepper motor controller 132 likewise provides a controlled pulse train on a line 134 for the operation of positioning roll drive means such as stepper motor 58. In a preferred mode of operation, electronic controller 70 provides a signal for operating stepper motor 58 at a continuous rate of speed.

Positioning rolls 48 and 50 are thereby rotating at a continuous predetermined speed.

As mentioned above, electronic controller 70 may be a personal computer. Stepper motor controllers 126 and 132 comprise plug-in ramping pulse generators, such as Model No. VCO-1006, manufactured by Servo Systems Co. in Montville, New Jersey, used with CMD-40 or CMD-50 step motor drivers, also manufactured by Servo Systems Co. The characteristics of the stepper motor controllers 126 and 132 provide for rapid acceleration and deceleration of stepper motors 56 and 58.

The support means for the coupon inserting apparatus is shown in Figs. 3 and 4. The support means comprises a housing 72 that includes a base support plate 74, two lateral plates 76 and 84, an intermediate support plate 80, a chute support plate 130 and an end support plate 132 (Fig. 4). One of the lateral plates 76 is secured to the base support plate 74 using fastening screws, one of which is designated as fastening screw 78, inserted through an aperture formed in the base support plate 74 and mated with threaded opening formed in the edge of side plate 76. Intermediate support plate 80 is secured to lateral support plate 76 with fastening screws, one of which is designated as fastening screw 82. Fastening screw 82 is inserted in an aperture formed in side plate 76 and mates with a threaded opening formed in the edge of intermediate support plate 80. Similarly, lateral plate 84 is secured to intermediate support plate 80 by fastening screws, one of which is designated as fastening screw 86.

As best seen in Fig. 4, an end support plate 132 is fastened to the bottom support plate 74 and abuts lateral support plates 76 and 84. End support plate 132 is secured to base support plate 74 by fastening screws such as screw 134 which passes through an aperture in end support plate 132 and mates with a threaded hole in the edge of bottom support plate 74. A chute support plate 130 abuts end plate 132 and is joined with end plate 32 with fastening screws 136 and 138. Chute support plate 130 provides a platform for the stream of coupons entering coupon inserting head 8.

The coupon web supply means is also shown in Figs. 3 and 4. The coupon web supply means includes a flexible feed chute 88 that guides the stream of coupons from the continuous web of coupons 46 (Fig. 1). The flexible feed chute 88 is an enclosed carrier, preferably constructed of a flexible conduit such as Conduflex, manufactured by Kabelschlep. Flexible feed chute 88 is attached to housing 72 by mounting bracket 138. Mounting bracket 138 includes a flange (not shown) that is fastened to end support plate 132 with fastening screws which mate with threaded holes in end support plate 132.

A feeding guide 110 is mounted on chute support plate 130 to provide alignment of the stream of coupons entering coupon inserting head 8. Feeding guide 110 is adjustably mounted with the use of a pair of tensioning screws that are biased to provide light compression to feeding guide 110 against chute plate 30. For example, tensioning screw 142 and spring 144 provide downward force to feeding guide 110. By adjusting the position of tensioning screw 142, feeding guide 110 accommodates different weights and thicknesses of coupons which pass between the chute plate 130 and the guide 110.

Fig. 4 further illustrates the coupon sensor means of the present invention which senses the presence and the absence of a coupon at a sensing location between the positioning rolls 48, 50 and the feeding rolls 36, 38. A light reflective sensor 62 is positioned between the feeding rolls 36, 38 and the positioning rolls 48, 50 with the use of a bracket 144. Sensor 62 provides a light source as well as a sensor that detects the beam generated by the light source when reflected by a coupon positioned at the sensing location. One satisfactory light reflective sensor is a fiber optic sensor manufactured by Omron. Bracket 144 is mounted to one lateral plate 84 of housing 72 by a screw 146 which mates with a thread aperture in lateral plate 84. Bracket 144 may thereby pivot about the axis defined by screw 146 to provide adjustment of the location of sensor 62. Further, bracket 144 may be constructed of cooperating hinge parts 144a and 144b which are adjustable about a hinge axis 145 to provide further adjustment of the location of coupon sensor 62. The exact location of the sensing position depends upon the particular geometry of the head. The spacing between the feed rolls 36 and 38 and positioning rolls 48 and 50 must always exceed one coupon length and the sensing position be such that the sensor 62 can respond to the gap between the forwardmost coupon 20 and the next coupon when the forwardmost coupon 20 is severed and accelerated. In one embodiment the coupon sensor 62 may be located approximately 1/4 inch from the periphery of the positioning rolls 48 and 50 so that the presence of a coupon is detected just before the coupon reaches the bight 49 formed by the rotating positioning rolls 48 and 50. Of course, if coupon sensor 62 is located too close to positioning rolls 48 and 50, the feed roll drive means may not deactuate the feed rolls 36 and 38 in sufficient time to prevent the leadmost edge of a coupon from entering the bight formed by positioning rolls 48 and 50. In this instance, the system would not be able to control intermittent feeding.

Figs. 3 and 4 further illustrate the positioning roll means of the present invention. The positioning

roll means comprises positioning roll 48 spaced from positioning roll 50. A bight 49 formed by the positioning rolls 48 and 50 draws the leading edge of a coupon to be ejected by positioning rolls 48 and 50 toward a predetermined location where the coupon is desired. Positioning rolls 48 and 50 are rotatably mounted via positioning roll shafts 52 and 54 into apertures with bearing surfaces formed in the lateral plates 76 and 84 of housing 72. As is best seen in Fig. 4, positioning shaft 52 is adjustable within slot 146 of side plate 76. A pair of tensioning screws, such as tensioning screw 148 threaded within a slot in lateral side 76, provide compression to positioning roll shaft 52. Positioning roll 48 may thereby be adjusted to vary the gap between rolls 48 and 50 and accommodate different weights and thicknesses of coupons.

Figs. 3 and 4 likewise illustrate the feeding roll means of the present invention. The feeding roll means comprises feed rolls 36 and 38 located upstream of the positioning rolls 46 and 48 in excess of one coupon length. Feed roll 36 is rotatably mounted to the lateral sides 76 and 84 of housing 72 via a shaft 40 fitted within slots in lateral sides 76 and 84 having bearing surfaces formed therein. Feed roll 38 is positioned from feed roll 36 and is rotatably mounted to lateral sides 76 and 84 via a shaft 42. Shaft 42 likewise fits within slots in lateral sides 76 and 84 having bearing surfaces formed therein. Shaft 40 is adjustable within a pair of slots, including slot 152, with the use of a pair of tensioning screws such as tensioning screw 154 that mates with a threaded slot formed in lateral plate 76. Tensioning screw 154 provides downward compression to feed roll shaft 40, thereby adjusting the gap between the feed rolls 36 and 38.

Preferably, the positioning rolls 50 and 52 and the feed rolls 36 and 38 are the same diameter, most preferably .75 inch. Both sets of rolls are constructed of steel. In the preferred embodiment, one of the feed rolls and one of the rolls 50 are nerled to insure positive control of the coupons.

Figs. 3 and 4 further illustrate the drive means of the present invention. As shown in Fig. 3, a stepper motor 58 for driving the positioning rolls 48 and 50 is shown. Stepper motor 58 is mounted to the lateral side 76 of housing 72 with the use of mounting screws, one of which is shown as mounting screw 156 which fits into a threaded aperture formed in lateral side 76.

As best seen in Fig. 4, stepper motor 58 includes a drive shaft 56. A linked drive chain 102 traverses a drive sprocket 100 mounted to drive shaft 56 and a driven sprocket 104 mounted to the lower positioning roll shaft 54. The chain 102 thereby transfers torque to the positioning roll shaft 54 and positioning roll 50. Positioning roll 48 is an

idler roller and rotates in the opposite direction from lower positioning roller 50 to define the bight 49. In the preferred embodiment, the gear ratio between drive sprocket 100 and driven sprocket 104 is one to one for precise control of the rotation of positioning roll 50.

The feed drive means includes a stepper motor 56 fixedly mounted to the lateral side 76 of housing 72. Four mounting screws, including mounting screw 158 which fits within a threaded aperture formed in lateral side 76, secure stepper motor 56 to housing 72. Stepper motor 56 has a drive shaft 57 carrying a drive sprocket 106. A linked drive chain 108 transfers torque from drive shaft 57 to driven sprocket 98 which, in turn, is mounted to feed roll shaft 42. Feed roll 36 is an idler roller that rotates in the opposite direction from lower feed roll 38 whereby a feed roll bight is defined. The gear ratio between sprocket 106 and sprocket 98 is preferably one to one to provide positive control for the actuation and deactuation of feed roll 38. Timing belts with associated pulley means can also be used to drive positioning rolls 50 and 52 and feed rolls 36 and 38.

Stepper motors 56 and 58 are precisely controllable in both speed and direction. One satisfactory stepper motor is Rapid-Syn, Model No. 34D-9209A, motors manufactured by Computer Devices. While the speed of the motors generally depends upon the load, the stepper motor 58 for driving positioning rolls 48 and 50 were operated at approximately 100 revolutions per minute in one embodiment. Stepper motor 56 driving feed rolls 36 and 38 intermittently must operate at a rotational speed less than that of the positioning rolls. For example, the rotation was 50 revolutions per minute in the example cited. The rotational speeds of stepper motors 56 and 58 will vary depending on the application. It is desired that the motors have very high acceleration and deceleration to achieve a more precise feed of the individual coupons. At lower speeds, actuation and deactuation of the motors is more precisely controllable, but coupon placement is more positive at higher speeds.

While stepper motors are preferred, servomotors or DC motors have also been used successfully. For example, in the arrangement where positioning rolls 50 and 52 are continuously rotating, stepper motor 58 could be replaced by a servomotor to achieve a higher rotational speed for positioning rolls 50 and 52. In this arrangement, the bight 49 formed by positioning rolls 50 and 52 draws the lead edge of the forwardmost coupon 20 at a greater linear speed, increasing the tension between forwardmost coupon 20 and the next succeeding coupon 22 and thereby creating more positive detachment of the trailing edge of forwardmost coupon 20 from the leading edge of the next

coupon along the perforated line of separation. The positioning rollers 50 and 52 will also direct the forwardmost coupon 17 toward the predetermined location at an increased rate of speed. This arrangement is particularly useful to fire the forwardmost coupon 20 into a container at a location of insertion fairly distant from positioning rolls 48 and 50.

Figs. 5, 6, and 7 illustrate the adjustability of portable feed head 8 to locate the coupon inserting apparatus 5 to define particular points of insertion. As shown in Fig. 5, a universal mounting joint 92 is secured to the lower side of the support plate 74. Three equispaced screws 164, pass through apertures in universal mounting joint 92 and mate with a threaded aperture in support plate 74 to secure universal mounting joint 92 thereto.

Universal mounting joint 92 includes a ball portion 168 that interfits in a socket portion 170, and is universally rotatable within socket portion 170. A shaft 94 extends from an arcuate opening 174 provided in ball portion 168 and is free to rock therein. A securing means 172 fixedly secures socket portion 170 and shaft 94 in the desired position. As best seen in Fig. 1, shaft 94 is pivotally connected to the vertical support 6 of the coupon inserting apparatus.

Fig. 6 illustrates the coordination of the universal mounting joint 92 and the flexible feed chute 88. As is shown in Fig. 1, the coupon inserting head 8 may be vertically positioned by shifting clamp 7 vertically on column 6 and arm 94 can be tilted about a rotary joint 7 to define a support point for head 8. Head 8 can then be universally positioned about that support point by universal joint 170. Thereby, positioning rolls 48 and 50 may be oriented as desired relative to a multiplicity of conveyor belt configurations. Thus, the advantages of a flexible feed chute, such as feed chute 88, becomes apparent. Feed chute 88 provides a continuous path for the stream of coupons fed into inserting head 8 irrespective of feed head 8 orientation. For example, coupon inserting head 8 works just as well when directed downwardly to inject coupons toward an insertion location from above.

Similarly, Fig. 7 illustrates the horizontal adjustability of coupon inserting head 8. This may be accomplished by repositioning stand 14 or rotating arm 94 about standard 6. Likewise, feed chute 88 provides a continuous path for the stream of coupons and enables inserting head to be horizontally adjusted about universal joint 92.

Fig. 10 illustrates the timing system associated with the present invention. A first reflective photoelectric sensor 24 and a second reflective photoelectric sensor 26 are positioned relative to a conveying system 11 which transports containers

10. The beams generated by the sources of light provided by light reflective sensors 24 and 26 are shown by lines 28 and 30 transverse to the container path. In the preferred embodiment, sensors 24 and 26 operate the same as coupon sensor 62. As the leading edge of a container interrupts the beam generated by first light reflective sensor 24, a timing signal on the line 32 is received by signal processor 70. The container thereafter interrupts the beam generated by second light reflective sensor 26, and a second timing signal on the line 34 is received by the signal processor 70.

From these data, signal processor 70 is programmed to calculate the line speed of each container. Also, a determination of the time at which the container will reach a predetermined location of insertion is also calculated. At the appropriate time, signal processor 70 commands the feed drive means of the system to actuate, thereby accelerating feed rolls 36 and 38 and moving the forwardmost coupon toward the bight formed by positioning rolls 48 and 50.

The timing means also includes a timing adjustment factor to allow the coupon inserting head 8 to inject coupons into containers at varying distances relative to the positioning rolls 48 and 50. The timing adjustment factor is software controlled. For example, if the predetermined location for insertion is relatively far away from positioning rolls 48 and 50, the timing adjustment factor will decrease any delay in the actuation of the feed rolls 36 and 38. The forwardmost coupon will therefore be moved into the positioning rolls 48 and 50, burst from the next succeeding coupon, and dispensed toward the predetermined location for insertion at a time before the container reaches the point of insertion.

Other data including the rotational speed of stepper motors 56 and 58, are necessary to accomplish a suitable and reliable feed. The rotational speed of stepper motor 56 and the rotational speed of feed rolls 36 and 38 must be known to coordinate the timing of the forwardmost coupon 20 entering the bight 49 with container position. Likewise, the rotational speed of stepper motor 58 and positioning rolls 48 and 50 must be set to move forwardmost coupon at a known linear speed for a successful feed.

A variation of the timing means is provided with one operating light reflective sensor, for example, light reflective sensor 24. In this arrangement, the containers must be travelling at a constant linear speed. The processor 70 is preprogrammed with speed data coordinated with the constant speed of the containers. As the forwardmost edge of a container interrupts the beam generated by light reflective sensor 24, a timing signal represented by line 32 is received by processor 70, indicative of the

container position. Using the preprogrammed speed data, the processor 70 makes a determination of the interval necessary for the container to reach the predetermined point of insertion.

Figs. 8, 9 and 10 illustrate the operation of coupon inserting apparatus 5. Signal processor 70 provides logical control for the coupon inserting head 8. Signal processor 70 receives a signal on line 32 from the first light reflective sensor 24 corresponding to the detection of a container moving in a direction indicated by arrow 15. As the container interrupts the beam generated by the second light reflective sensor 26, signal processor 70 receives a signal on line 34 from the second light reflective sensor 26. From these data, processor 70 calculates the line speed associated with the moving container, and thereby calculates the time interval necessary for the moving container to reach the location of insertion. This interval determines the predetermined time for actuation of head 8 for insertion of the forwardmost coupon 20 into an associated container.

At the appropriate time, processor 70 applies a signal on a line 128 via stepper motor driver 126 to actuate stepper motor 56. Stepper motor 56 thereby drives feed rolls 36 and 38 which move forwardmost coupon 20 toward the bight 49 defined by positioning rolls 48 and 50. The forwardmost coupon 20 interrupts coupon sensor 62 as it is drawn toward positioning rolls 48 and 50. Sensor 62 provides a signal on a line 120 to processor 70 to indicate the presence of forwardmost coupon 20.

During this operation, positioning rolls 48 and 50 are driven by stepper motor 58 at a constant predetermined rotational speed which is greater than the rotational speed of feed rolls 36 and 38. The bight 49 formed by positioning rolls 48 and 50 receives the leading edge of forwardmost coupon 20 while the perforated line separating the trailing edge of forwardmost coupon 20 and the leading edge of the next succeeding coupon is between feed rolls 36 and 38 and the sensing position defined by sensor 62. The tensile force between positioning rolls 48 and 50 and feed rolls 36 and 38 sever the forwardmost coupon 20 from the next succeeding coupon 22 at perforated line 18. Positioning rolls 48 and 50 thereafter rapidly dispense forwardmost coupon 20 at the predetermined location of insertion. Forwardmost coupon 20 is thereby injected into the appropriate container as it intercepts the predetermined location of insertion and this causes the light source provided by sensor 62 to be uninterrupted.

As the forwardmost coupon 20 is severed from the next coupon 22, coupon sensor 62 senses the absence of a coupon at the sensing point between the feed rolls 36 and 38 and the positioning rolls 48 and 50. An appropriate signal is received by pro-

cessor 70 on line 120. The next coupon 22 continues to be drawn by feed rolls 36 and 38 and interrupts the coupon sensor 62 providing the appropriate signal to processor 70. Upon the sequential sensing of the absence of a coupon followed by the presence of a coupon, processor 70 sends the appropriate signal via line 128 to deactuate stepper motor 56, thereby deactuating the feed rolls 36 and 38. Processor 70 thereafter awaits the processing of information with respect to the next container that passes the first light reflective sensor 24. The next coupon is then inserted in the manner described above.

In another embodiment of the coupon inserting apparatus, signal processor 70 provides the appropriate signals to control stepper motor 56 for driving the feed rolls 36 and 38 and also stepper motor 58 for driving positioning rolls 48 and 50. In this mode of operation, stepper motor 58 is actuated during the coupon insertion routine and deactuated while the next succeeding container is arriving at the predetermined location for insertion. Maximized energy efficiency and reduced wear may thereby be achieved during a slower moving operation. This arrangement is appropriate for containers travelling at slower speeds.

The signal processor 70 must be programmed to provide the appropriate signals for controlling stepper motors. At the appropriate time determined by the timing means, the controller 70 provides a signal on line 134 to actuate stepper motor 58 for driving the positioning rolls 48 and 50 as well as a signal via line 128 to actuate stepper motor 56 for driving feed rolls 36 and 38. Stepper motor 58 should be actuated before stepper motor 56 is actuated to accomplish bursting of the coupon. That is, positioning rolls 48 and 50 must be rotating at a sufficient speed to draw the leading edge of the forwardmost coupon into the bight formed by positioning rolls 48 and 50 when the coupon arrives.

In this regard, a breaker member 51 (diagrammatically shown in broken lines in Fig. 6) may be placed between positioning rolls 48 and 50 and feed rolls 36 and 38. The breaker member is generally transverse to the path of the stream of coupons entering feed rolls 36 and 38, and has a portion extending in the coupon path 53. It is desired that breaker member is slightly sloped, having one side elevated relative to the other side. As the forwardmost coupon is drawn by the feed rolls 36 and 38 toward the positioning rolls 48, 50, the coupon travels over the breaker member 51. When the bight formed by positioning rolls 48 and 50 receives the leading edge 19 of forwardmost coupon 20, the perforated line 18 which separates the trailing edge of forwardmost coupon 20 and the leading edge of the next coupon 22 is approxi-

mately aligned with the breaker member 51. The tension provided between positioning rolls 48 and 50 and feed rolls 36 and 38 is thereby concentrated on one side of perforated line 18 with the use of the breaker member. The trailing edge of forwardmost coupon 20 more easily tears from the next succeeding coupon in this manner because bursting is initiated in a local area determined by the interference from the portion of the breaker member 51 protruding into the coupon path 53. A protuberant breaker member is particularly useful when positioning rolls 48 and 50 are rotating at relatively low speeds.

In another mode of operation, controller 70 operates stepper motor 56 and stepper motor 58 to burst the forwardmost coupon from the next succeeding coupon in the manner described above. Controller 70 then operates to rapidly decelerate stepper motor 58 before the trailing edge of forwardmost coupon 20 exists the bight formed by positioning rolls 48 and 50, trapping the forwardmost coupon 20 between positioning rolls 48 and 50 in a stationary position. At the appropriate time, controller 70 sends a signal in response to the timing data generated in relation to the container position to actuate stepper motor 58. Positioning rolls 48 and 50 are thereby accelerated, dispensing the coupon into the container.

In this mode of operation, the feed rolls 36 and 38 may be actuated during the wait period while forwardmost coupon 20 is trapped in the bight formed by positioning rolls 48 and 50 to move the next coupon 22 into a position between positioning rolls 48 and 50 and feed rolls 36 and 38. The coupon advances until the coupon sensor detects the presence of the next coupon 22. In this manner, the overall speed of the container processing system may be increased.

In the preferred embodiment the coupon supply is maintained on a roll or drum such as drum 9. In an alternate embodiment, shown in Fig. 11, coupon inserting head 8 is part of a fully integrated system, whereby a large roll of unfolded coupons 300 is fed to a folding, perforating and take-up apparatus. The unfolded coupons from roll 300 are fed to longitudinal folder 302. The output of folder 302 is a longitudinally folded stream 304 which is fed to a perforator 306. The output 308 of perforator 306 is identical to the web 46 shown in Fig. 1 and is fed through a take-up system 310 to feeder rolls 36 and 38. Take-up system 310 is of a conventional type used to permit relatively continuous operation of the folder 302 and perforator 306 while feeding intermittent feed rolls 36 and 38.

Fig. 12 diagrammatically shows a stack of prefolded and perforated coupons 46 formed into a fan-fold 312 in a tray 314. The web 46 is fed over one or more guide rolls 316 directly into the feed

rolls 36 and 38. Thereafter this embodiment functions in exactly the same manner as the system of Fig. 1.

# Claims

1. Apparatus for positioning coupons (20), one at a time, at a predetermined location at a predetermined time, each of said coupons (20) having a leading edge and a trailing edge, said coupons (20) being provided as a stream of coupons arranged in a continuous web (46) of successive coupons with a forwardmost coupon having its trailing edge connected to the leading edge of the next coupon and each successive coupon being similarly connected in said web,

characterised in that said apparatus is for use with coupons connected by a weakened web portion extending transversely of the web, and said apparatus comprises;

support means (72);

positioning roll means (48, 50) rotatably mounted relative to said support means and defining a bight to receive the leading edge of said forwardmost coupon (20);

feed roll means (36, 38) rotatably mounted relative to said support means (72) and spaced from said positioning roll means (48, 50) by a distance in excess of one coupon length, said feed roll means (36, 38) being oriented to direct said leading edge of said forwardmost coupon (20) into said bight;

sensor means (62) to sense the presence of and the absence of a coupon (20) at a sensing position between said feed roll means and said positioning roll means;

positioning drive means (58) to rotate said positioning roll means (48, 50) to move said forwardmost coupon at a predetermined speed;

feed drive means (56) to intermittently drive said feed roll means (36, 38) to move said leading edge of said forwardmost coupon toward said bight at a speed less than said predetermined speed whereby said positioning roll means (48, 50) upon receipt of said leading edge in said bight separates the trailing edge of said forwardmost coupon from the leading edge of the next coupon, providing a gap therebetween at said sensing position; and

control means including timing means (24, 26) providing a signal related to the time which the forwardmost coupon is to be positioned at said predetermined location and means to actuate said feed drive means (56) in response to said timing means and to the presence of said forwardmost coupon at said sensing position

and to deactuate said feed drive means (56) upon the sequential sensing of the absence and then the presence of a coupon at said sensing position.

2. Apparatus according to claim 1 and further comprising;

coupon web supply means (9) positioned relative to said support means (72) to supply said continuous web (46) to said feed roll means (36, 38);

3. The apparatus of claim 1 or claim 2 and adapted for coupons (20) in which said weakened web portions are perforated lines.

4. The apparatus of claim 2, wherein said coupon web supply means (9) is a flexible conduit (88) mounted to said support means (72) upstream of said feed roll means (36, 38).

5. The apparatus of claim 4, further comprising locating means (138) mounted to said support means (72) for angularly positioning said flexible conduit (88) about a pivot, said locating means (138) cooperating with said coupon web supply means (9) for orienting said support means (72) relative to said predetermined location.

6. The apparatus of any preceding claim, wherein said positioning roll means comprises a first pair of rollers (48, 50) mounted to said support means (72) for rotation about axes transverse to said continuous web (46) of coupons.

7. The apparatus of any preceding claim, wherein said positioning drive means (58) is intermittently actuated by said control means synchronously with said feed drive means (56).

8. The apparatus of any preceding claim, wherein said feed roll means comprises a second pair of rollers (36, 38) mounted to said support means (72) for rotation about axes transverse to said continuous web (46) of coupons, said second pair of rollers (36, 38) located upstream of said first pair of rollers (48, 50).

9. The apparatus of any preceding claim, wherein said sensor means comprises a first photoelectric sensor (62) for generating a signal indicative of the presence of said coupon at said sensing position and circuit means responsive to the absence of such a coupon.

10. The apparatus of any preceding claim, wherein said timing means includes detector means

- (24, 26) for detecting a container (10) moving relative to said predetermined location and for providing said signal indicative of said container position to actuate said feed drive means (56) for separating the forwardmost coupon from the leading edge of the next coupon and inserting said forwardmost coupon into said container.
11. The apparatus of claim 10 wherein said timing means and detector means (24, 26) provide a timing signal relating to the position and rate of change of position of said container (10).
12. The apparatus of claim 10, wherein said control means includes means for determining said time, said time also being the time when said container reaches said predetermined location.
13. The apparatus of any of claims 10-12, wherein said container detector means (24, 26) comprises a second photoelectric sensor means.
14. The apparatus of any of claims 1-9, wherein said timing means comprises first and second photoelectric sensors (24, 26) disposed at a fixed distance from each other and relative to said predetermined location, said first and second photoelectric sensors providing signals indicative of the detection of a forwardmost container (10) in a plurality of moving containers moving at varying speeds relative to said predetermined location.
15. The apparatus of claim 14, wherein said control means includes means for calculating, responsive to said signals from said first and second photoelectric sensors, said time when said forwardmost container reaches said predetermined location.
16. A method for positioning coupons (20) one at a time, at a predetermined location at a predetermined time, each of said coupons having a leading edge and a trailing edge, said coupons being provided as a stream of coupons in a continuous web (96) with a forwardmost coupon (20) having its trailing edge connected by a weakened web portion to the leading edge of the next coupon (22) being similarly connected in said web, said method comprising the steps of:
- providing a timing signal related to said predetermined time at which said forwardmost coupon is to be positioned at said predetermined location;
  - sensing the presence of and the absence

of a coupon (20) at a sensing position along a coupon path relative to said predetermined location;

advancing said continuous web (46) along said coupon path toward said predetermined location in response to said timing signal and sensing the presence of said forwardmost coupon at said sensing position;

bursting said forwardmost coupon (20) from the next coupon in said continuous web (46) along said weakened web portion while at least a portion of said forwardmost coupon is at said coupon sensing position;

moving said forwardmost coupon toward said predetermined location at a predetermined speed, whereby said forwardmost coupon is positioned relative to said predetermined location at said predetermined time; and

arresting travel of said continuous web upon the sequential sensing of the absence of said forwardmost coupon and then the presence of the next succeeding coupon at said sensing position;

control means including timing means providing a timing signal related to the time at least one of said moving containers passes said point of insertion and means to actuate said feed drive means in response to said timing signal and to deactivate said feed drive means in response to said coupon sensing signal.

#### Patentansprüche

1. Vorrichtung zum Einlegen von Coupons (20) einzeln zu einem vorbestimmten Zeitpunkt an eine vorbestimmte Stelle, wobei jeder der Coupons (20) eine Vorderkante und eine Hinterkante hat und die Coupons (20) als Couponstrom zu einer stetigen Bahn (46) aufeinanderfolgender Coupons angeordnet sind, von denen der vorderste mit seiner Hinterkante mit der Vorderkante des nächsten Coupons verbunden ist und jeder folgende Coupon entsprechend in die Bahn eingebunden ist, **dadurch gekennzeichnet**, daß die Vorrichtung zur Verwendung mit Coupons ausgeführt ist, die ein quer zur Bahn verlaufender geschwächter Bahnteil verbindet, und die Vorrichtung aufweist
- eine Tragvorrichtung (72),
  - eine Anordnung von Positionierrollen (48, 50), die relativ zur Tragvorrichtung drehbar gelagert sind und einen Einzug zur Aufnahme der Vorderkante des vordersten Coupons (20) bilden,
  - eine Anordnung von Vorschubrollen (36, 38), die relativ zur Tragvorrichtung (72) dreh-

- bar gelagert und von den Positionierrollen (49, 50) eine Strecke beabstandet sind, die größer ist als eine Couponlänge, wobei die Vorschubrollen-Anordnung (36, 38) so orientiert ist daß sie die Vorderkante des vordersten Coupons (20) in den Einzug einführt,
- eine Sensoreinrichtung (62) zum Erfassen des Vorliegens bzw. Fehlens eines Coupons (20) an einer Erfassungsstelle zwischen der Vorschub- und der Positionierrollen-Anordnung,
- einen Positionierantrieb (58) zum Drehen der Positionierrollen-Anordnung (48, 50) derart, daß sie den vordersten Coupon mit vorbestimmter Geschwindigkeit bewegt,
- einen Vorschubantrieb (56), der die Vorschubrollen-Anordnung (36, 38) intermittierend so antreibt, daß die Vorderkante des vordersten Coupons mit einer geringeren als der vorbestimmten Geschwindigkeit zum Einzug hin bewegt wird, wobei die Positionierrollen-Anordnung (48, 50) beim Einlauf der Vorderkante in den Einzug die Hinterkante des vordersten Coupons von der Vorderkante des nächsten Coupons trennt und zwischen ihnen an der Erfassungsstelle einen Spalt erzeugt, sowie
- eine Steuerung mit einem Zeitgeber (24, 26), der ein Signal hinsichtlich des Zeitpunkts abgibt, an dem der vorderste Coupon an die vorbestimmte Stelle gebracht werden soll, sowie eine Einrichtung aufweist, die den Vorschubantrieb (56) ansprechend auf den Zeitgeber und auf die Anwesenheit des vordersten Coupons an der Erfassungsstelle aktiviert und ihn bei der aufeinanderfolgenden Erfassung des Fehlens und dann des Vorliegens des Coupons an der Erfassungsstelle deaktiviert.
2. Vorrichtung nach Anspruch 1, **gekennzeichnet** durch eine Couponbahn-Zufuhreinrichtung (9), die relativ zur Trageinrichtung (72) so angeordnet ist, daß die kontinuierliche Bahn (46) der Vorschubrollen-Anordnung (36, 38) zugeführt wird.
  3. Vorrichtung nach Anspruch 1 oder 2 für die Verwendung mit Coupons (20), bei denen es sich bei dem geschwächten Bahnteil um Perforationslinien handelt.
  4. Vorrichtung nach Anspruch 2, **dadurch gekennzeichnet**, daß es sich bei der Couponbahn-Zufuhreinrichtung (9) um ein flexibles Rohr (88) handelt, das stromaufwärts der Vorschubrollen-Anordnung (36, 38) an der Tragvorrichtung (72) gelagert ist.
  5. Vorrichtung nach Anspruch 4, **gekennzeichnet** durch eine auf der Tragvorrichtung (72) angeordnete Stalleinrichtung (138), die das flexible Rohr (88) um einen Schwenklagerpunkt winklig positioniert und die mit der Couponbahn-Zufuhreinrichtung (9) zusammenarbeitet, um die Tragvorrichtung (72) relativ zu der vorbestimmten Stelle auszurichten.
  6. Vorrichtung nach einem der vorgehenden Ansprüche, **dadurch gekennzeichnet**, daß die Positionierrollen-Anordnung ein erstes Paar Rollen (48, 50) aufweist, die um zur stetigen Couponbahn (46) querverlaufende Achsen drehbar auf der Tragvorrichtung (72) gelagert sind.
  7. Vorrichtung nach einem der vorgehenden Ansprüche, **dadurch gekennzeichnet**, daß der Positionierantrieb (58) von der Steuerung synchron mit dem Vorschubantrieb (56) intermittierend betätigt wird.
  8. Vorrichtung nach einem der vorgehenden Ansprüche, **dadurch gekennzeichnet**, daß die Vorschubrollen-Anordnung ein zweites Paar Rollen (36, 38) aufweist, die um zur kontinuierlichen Couponbahn (46) querverlaufende Achsen drehbar auf der Tragvorrichtung (72) gelagert sind, wobei das Paar Rollen (36, 38) stromaufwärts des ersten Paares Rollen (48, 50) liegt.
  9. Vorrichtung nach einem der vorgehenden Ansprüche, **dadurch gekennzeichnet**, daß die Sensoreinrichtung einen ersten photoelektrischen Sensor (62) zum Erzeugen eines Signals beim Vorliegen des Coupons an der Erfassungsstelle sowie eine elektrische Schaltung aufweist, die auf das Fehlen eines solchen Coupons reagiert.
  10. Vorrichtung nach einem der vorgehenden Ansprüche, **dadurch gekennzeichnet**, daß der Zeitgeber einen Detektor (24, 26) aufweist, der einen sich relativ zur vorbestimmten Stelle bewegenden Behälter (10) erfaßt und das die Behälterposition angegebende Signal abgibt, um den Vorschubantrieb (56) zu betätigen und so den vordersten Coupon von der Vorderkante des nächsten Coupons zu trennen und den vordersten Coupon in den Behälter einzulegen.
  11. Vorrichtung nach Anspruch 10, **dadurch gekennzeichnet**, daß der Zeitgeber und der Detektor (24, 26) ein Zeitsignal hinsichtlich der Position des Behälters (10) und deren zeitlicher Änderung liefern.

12. Vorrichtung nach Anspruch 10, **dadurch gekennzeichnet**, daß die Steuerung Mittel zur Bestimmung des besagten Zeitpunkts aufweist, der auch derjenige Zeitpunkt ist, an dem der Behälter die vorbestimmte Stelle erreicht. 5
13. Vorrichtung nach einem der Ansprüche 10 - 12, **dadurch gekennzeichnet**, daß der Behälterdetektor (24, 26) einen zweiten photoelektrischen Sensor aufweist. 10
14. Vorrichtung nach einem der Ansprüche 1 - 9, **dadurch gekennzeichnet**, daß der Zeitgeber einen ersten und einen zweiten photoelektrischen Sensor (24, 26) aufweist, die in festem Abstand voneinander und von der vorbestimmten Stelle angeordnet sind und die die Signale liefern, die das Erfassen eines vordersten Behälters (10) in einer Vielzahl von mit unterschiedlichen Geschwindigkeiten relativ zur vorbestimmten Stelle durchlaufenden Behältern anzeigen. 15 20
15. Vorrichtung nach Anspruch 14, **dadurch gekennzeichnet**, daß die Steuerung Mittel aufweist, die auf die Signale aus dem ersten und dem zweiten photoelektrischen Sensor reagierend den Zeitpunkt berechnen, an dem der vorderste Behälter die vorbestimmte Stelle erreicht. 25 30
16. Verfahren zum Einlegen von Coupons (20) einzeln zu einem vorbestimmten Zeitpunkt an eine vorbestimmte Stelle, wobei jeder der Coupons (20) eine Vorderkante und eine Hinterkante hat und die Coupons (20) als Couponstrom zu einer stetigen Bahn (96) aufeinanderfolgender Coupons angeordnet sind, von denen der vorderste Coupon (20) mit seiner Hinterkante über einen geschwächten Bahnteil mit der Vorderkante des nächsten Coupons (22) verbunden ist und jeder folgende Coupon entsprechend in die Bahn eingebunden ist, **dadurch gekennzeichnet**, daß 35 40
- ein Zeitsignal hinsichtlich des vorbestimmten Zeitpunkts erzeugt wird, an dem der vorderste Coupon sich an der vorbestimmten Stelle befinden soll, 45
- das Vorliegen oder Fehlen eines Coupons (20) an einer Erfassungsstelle entlang eines Couponwegs relativ zur vorbestimmten Stelle erfaßt wird, 50
- ansprechend auf das Zeitsignal die kontinuierliche Bahn (46) entlang des Couponwegs zu der vorbestimmten Stelle hin bewegt und das Vorliegen des vordersten Coupons an der Erfassungsstelle erfaßt wird, 55
- der vorderste Coupon (20) vom nächsten

Coupon in der kontinuierlichen Bahn (46) entlang des geschwächten Bahnteils getrennt wird, während mindestens ein Teil des vordersten Coupons sich an der Coupon-Erfassungsstelle befindet,

der vorderste Coupon mit vorbestimmter Geschwindigkeit zu der vorbestimmten Stelle hin bewegt wird, wobei der vorderste Coupon zum vorbestimmten Zeitpunkt relativ zu der vorbestimmten Stelle positioniert wird, und

die Bewegung der kontinuierlichen Bahn beim aufeinanderfolgenden Erfassen des Fehlens des vordersten Coupons und dann des Vorliegens des folgenden Coupons an der Erfassungsstelle unterbrochen wird, wobei

die den Zeitgeber aufweisende Steuerung ein Zeitsignal hinsichtlich des Zeitpunkts liefert, an dem mindestens einer der durchlaufenden Behälter am Einlegepunkt vorbeiläuft, und der Vorschubantrieb ansprechend auf das Zeitsignal aktiviert und ansprechend auf das Couponerfassungssignal deaktiviert wird.

## Revendications

- Appareil pour le positionnement de bons (20), un par un, à un endroit prédéterminé et à un moment prédéterminé, chacun desdits bons (20) présentant un bord d'attaque ou avant et un bord de fuite ou arrière, lesdits bons (20) formant un courant de bons disposés selon une bande continue (46) de bons successifs, le bon le plus avancé présentant son bord d'attaque relié au bord de fuite du bon suivant, et chaque bon successif étant relié de façon semblable dans ladite bande,

ledit appareil étant caractérisé en ce qu'il est destiné à être utilisé avec des bons qui sont reliés par une partie de bande affaiblie s'étendant transversalement à la bande, et en ce que ledit appareil comprend :

des moyens de support (72) ;

des moyens formant rouleaux de positionnement (48, 50) montés en rotation par rapport auxdits moyens de support et définissant un interstice pour recevoir le bord d'attaque dudit bon (20) le plus avancé ;

des moyens formant rouleaux d'approvisionnement (36, 38) montés tournant par rapport auxdits moyens de support (72) et espacés desdits moyens (48, 50) formant rouleaux de positionnement d'une distance supérieure à la longueur d'un bon, lesdits moyens formant rouleaux d'approvisionnement (36, 38) étant orientés de façon à diriger ledit bord d'attaque dudit bon (20) le plus avancé pour le faire pénétrer dans ledit interstice ;

des moyens de détection (62) destinés à

détecter la présence et l'absence d'un bon (20) dans la position de détection comprise entre lesdits moyens formant rouleaux d'approvisionnement et lesdits moyens formant rouleaux de positionnement ;

des moyens (58) d'entraînement de positionnement pour faire tourner lesdits moyens formant rouleaux de positionnement (48, 50), de façon à déplacer ledit bon le plus avancé à une vitesse prédéterminée ;

des moyens d'entraînement (56) d'approvisionnement de façon à entraîner par intermittence lesdits moyens formant rouleaux d'approvisionnement (36, 38) de façon à déplacer ledit bord d'attaque dudit bon le plus avancé en direction dudit interstice à une vitesse inférieure à ladite vitesse prédéterminée, grâce à quoi, lesdits moyens formant rouleaux de positionnement (48, 50), lorsqu'ils reçoivent ledit bord d'attaque dans ledit interstice séparent le bord de fuite dudit bon le plus avancé avec le bord d'attaque du bon suivant, formant un intervalle entre eux à l'endroit de ladite position de détection ; et

des moyens de commande comprenant des moyens de temporisation (24, 26) fournissant un signal en relation avec le moment auquel le bon le plus avancé doit être positionné audit endroit prédéterminé et des moyens pour actionner lesdits moyens (56) d'entraînement d'approvisionnement en réponse auxdits moyens de temporisation et à la présence dudit bon le plus avancé à l'endroit de ladite position de détection et pour désactiver lesdits moyens (56) d'entraînement d'approvisionnement lors de la détection séquentielle de l'absence et ensuite de la présence d'un bon à l'endroit de ladite position de détection.

2. Appareil selon la revendication 1 comprenant en outre :  
des moyens (9) d'approvisionnement d'une bande de bons qui sont positionnés par rapport auxdits moyens (72) de support, de façon à fournir ladite bande continue (46) auxdits moyens (36, 38) formant rouleaux d'approvisionnement.
3. Appareil selon la revendication 1 ou la revendication 2 destiné à être utilisé en relation avec des bons (20) dans lesquels lesdites parties de bandes affaiblies sont des lignes perforées.
4. Appareil selon la revendication 2, dans lequel lesdits moyens (9) d'approvisionnement de la bande de bons sont constitués par un conduit souple (88) monté sur lesdits moyens support (72) en amont desdits moyens (36, 38) formant

rouleaux d'approvisionnement.

5. Appareil selon la revendication 4, comprenant en outre des moyens (138) de localisation montés sur lesdits moyens de support (72) pour positionner angulairement ledit conduit souple (88) autour d'un pivot, lesdits moyens de localisation (138) coopérant avec lesdits moyens (9) d'approvisionnement de la bande de bons pour orienter lesdits moyens de support (72) relativement à ladite position prédéterminée.
6. Appareil selon l'une quelconque des revendications précédentes, dans lequel lesdits moyens formant rouleaux de positionnement comprennent une première paire de rouleaux (48, 50) montés sur lesdits moyens de support (72) pour leur rotation autour d'axes dirigés transversalement à ladite bande (46) continue de bons.
7. Appareil selon l'une quelconque des revendications précédentes, dans lequel lesdits moyens (58) d'entraînement de positionnement sont actionnés par intermittence par lesdits moyens de commande en synchronisme avec lesdits moyens d'entraînement (56) d'approvisionnement.
8. Appareil selon l'une quelconque des revendications précédentes, dans lequel lesdits moyens formant rouleaux d'approvisionnement comprennent une seconde paire de rouleaux (36, 38) montés sur lesdits moyens de support (72) pour tourner autour d'axes dirigés transversalement par rapport à ladite bande continue (46) des bons, ladite seconde paire de rouleaux (36, 38) étant disposée en amont de ladite première paire de rouleaux (48, 50).
9. Appareil selon l'une quelconque des revendications précédentes, dans lequel lesdits moyens de détection comprennent un premier détecteur photoélectrique (62) destiné à engendrer un signal indiquant la présence dudit bon à l'endroit de ladite position de détection et des moyens de circuit répondant à l'absence d'un tel bon.
10. Appareil selon l'une quelconque des revendications précédentes, dans lequel lesdits moyens de temporisation comprennent des moyens de détection (24, 26) pour détecter un récipient (10) se déplaçant par rapport à ladite position prédéterminée et pour fournir ledit signal indicateur de la position dudit récipient, de façon à actionner lesdits moyens (56) d'en-

traînement d'approvisionnement pour séparer le bon le plus avancé du bord d'attaque du bon suivant et pour introduire ledit bon le plus avancé à l'intérieur dudit récipient.

11. Dispositif selon la revendication 10, dans lequel lesdits moyens de temporisation et lesdits moyens de détection (24, 26) fournissent un signal de temporisation en relation avec la position et la vitesse de modification de la position dudit récipient (10).

12. Appareil selon la revendication 10, dans lequel lesdits moyens de commande comprennent des moyens pour déterminer ledit moment, ledit moment étant également celui où ledit récipient atteint ladite position prédéterminée.

13. Appareil selon l'une quelconque des revendications 10 à 12, dans lequel lesdits moyens (24, 26) de détection de récipient comprennent un second moyen détecteur photoélectrique.

14. Appareil selon l'une quelconque des revendications 1 à 9 dans lequel lesdits moyens de temporisation comprennent un premier et un second détecteurs photoélectriques (24, 26) disposés à une distance fixe l'un de l'autre et par rapport à ladite position prédéterminée, lesdits premier et second détecteurs photoélectriques fournissant des signaux indicateurs de la détection du récipient (10) le plus avancé dans une pluralité de récipients qui se déplacent, en se déplaçant à des vitesses variables, relativement à ladite position prédéterminée.

15. Appareil selon la revendication 14, dans lequel lesdits moyens de commande comprennent des moyens pour calculer, en réponse auxdits signaux issus du premier et du second détecteurs photoélectriques, ledit moment où le récipient précité le plus avancé atteindra ladite position prédéterminée.

16. Procédé pour le positionnement de bons (20) un par un, à une position prédéterminée et à un moment prédéterminé, chacun desdits bons comportant un bord d'attaque ou avant et un bord de fuite ou arrière, lesdits bons étant formés en un courant de bons selon une bande continue (96) avec un bon (20) le plus avancé ayant son bord d'attaque relié par une partie de bande affaiblie au bord d'attaque du bon suivant (22) qui est relié de façon similaire dans ladite bande, ledit procédé comprenant les étapes consistant à :

fournir un signal de temporisation en rela-

tion avec ledit moment prédéterminé auquel ledit bon le plus avancé doit être positionné dans ladite position prédéterminée ;

détecter la présence de et l'absence d'un bon (20) à l'endroit de la position de détection suivant un trajet des bons par rapport à ladite position prédéterminée ;

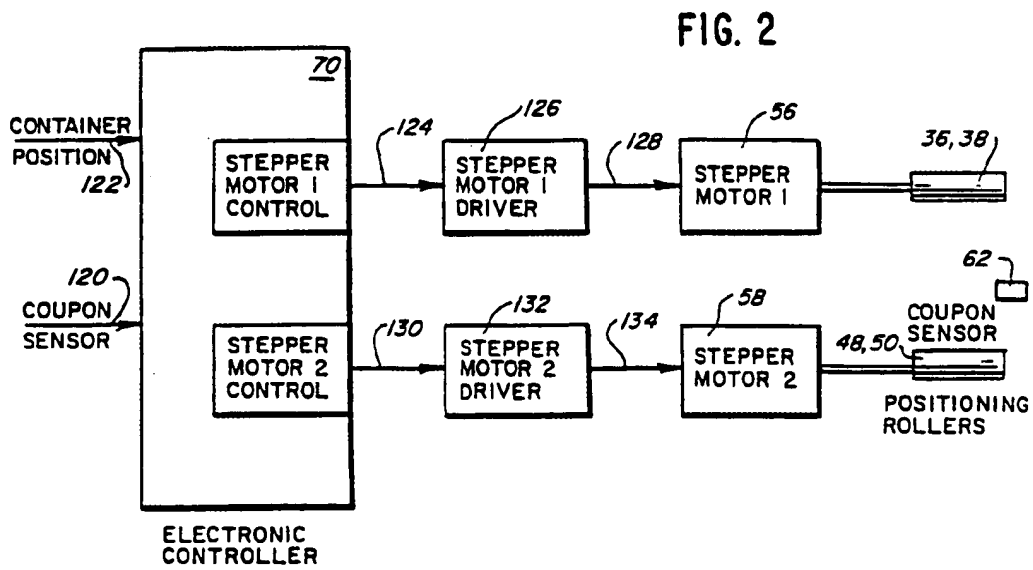
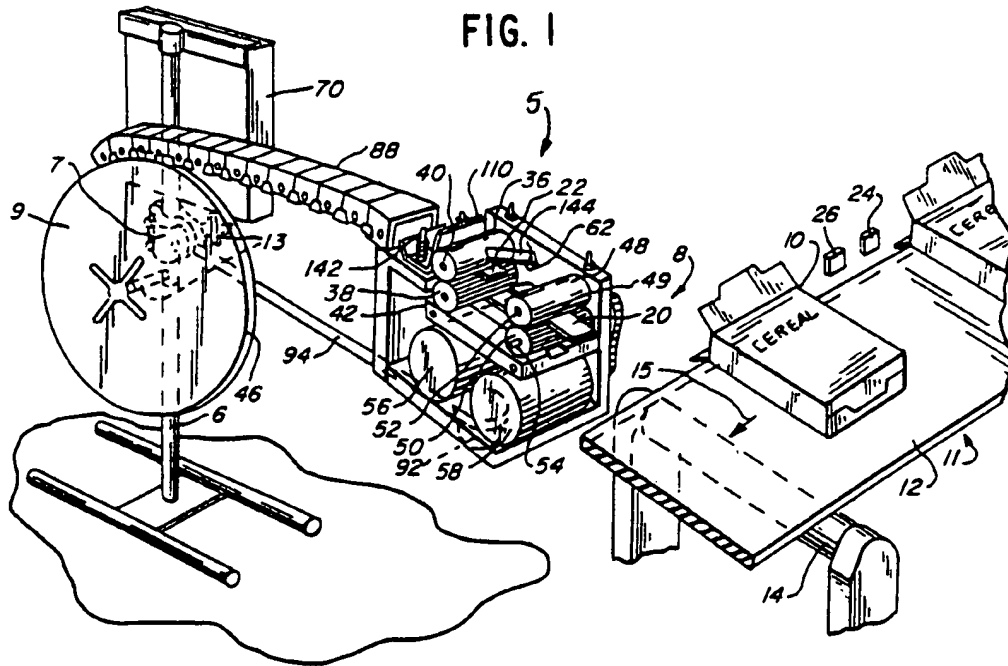
faire avancer ladite bande continue (96) le long dudit trajet de bons en direction de ladite position prédéterminée en réponse audit signal de temporisation et détecter la présence du bon précité le plus avancé dans ladite position de détection ;

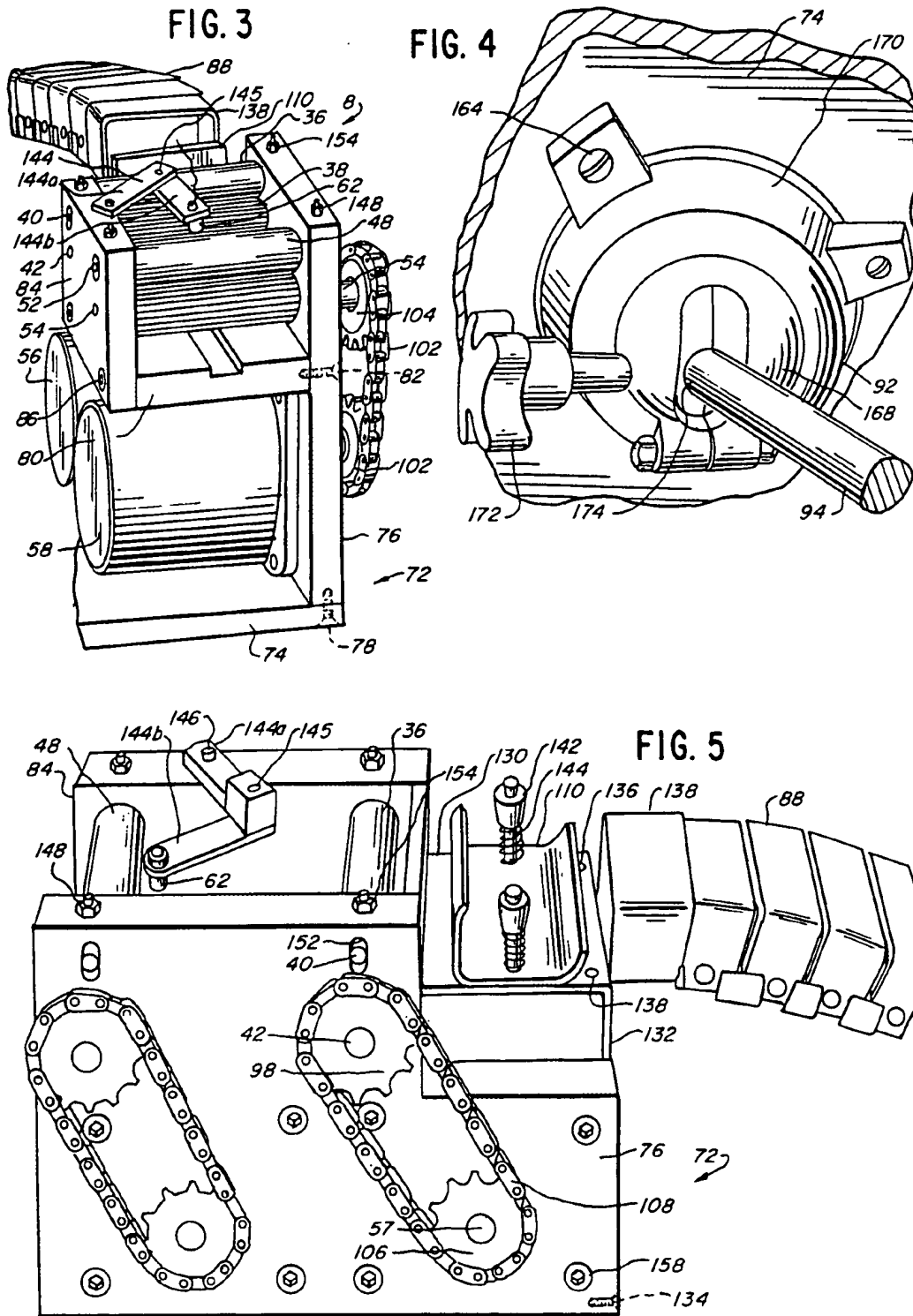
arracher ledit bon le plus avancé (20) du bon suivant dans ladite bande continue (46) suivant ladite partie affaiblie de bande lorsqu'au moins une partie dudit bon le plus avancé se trouve dans ladite position de détection du bon ;

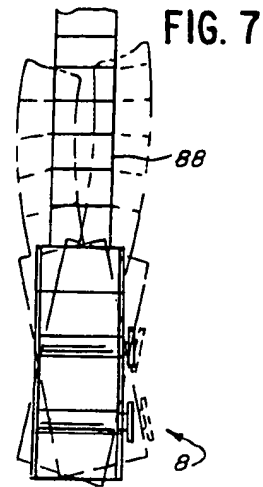
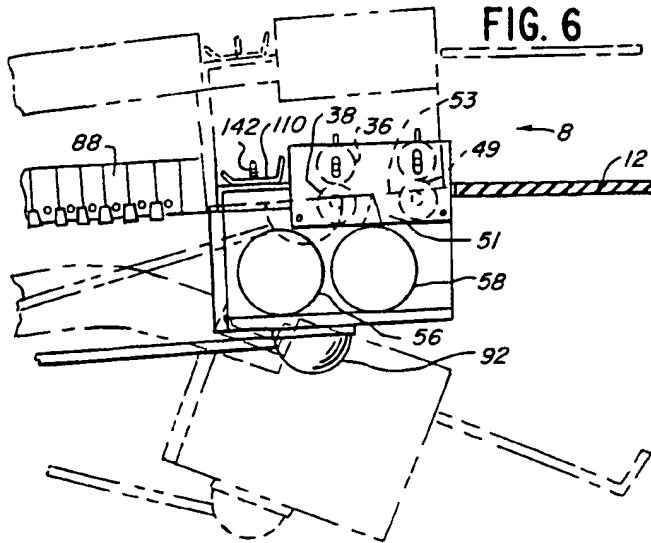
déplacer ledit bon le plus avancé en direction de ladite position prédéterminée à une vitesse prédéterminée, grâce à quoi ledit bon le plus avancé est positionné relativement à ladite position prédéterminée audit moment prédéterminé ; et

arrêter le mouvement de déplacement de ladite bande continue lors de la détection séquentielle de l'absence du bon précité le plus avancé et ensuite la présence du bon suivant dans ladite position de détection ;

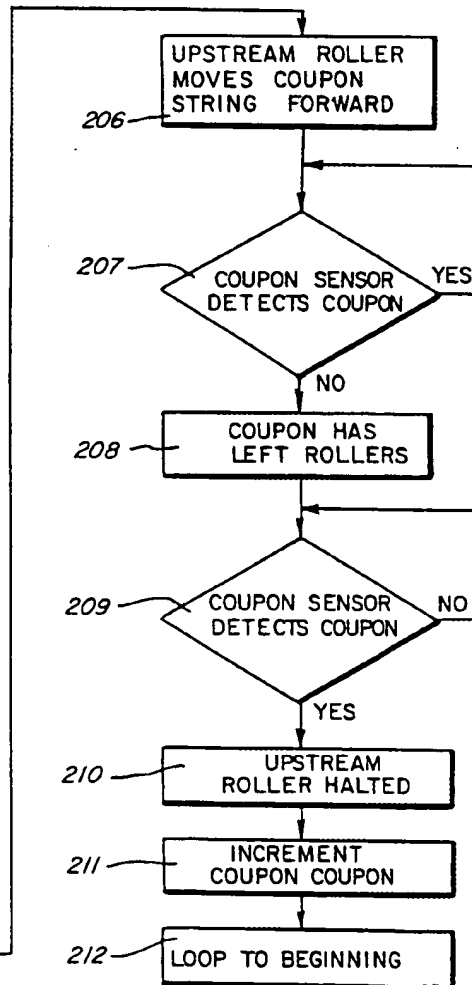
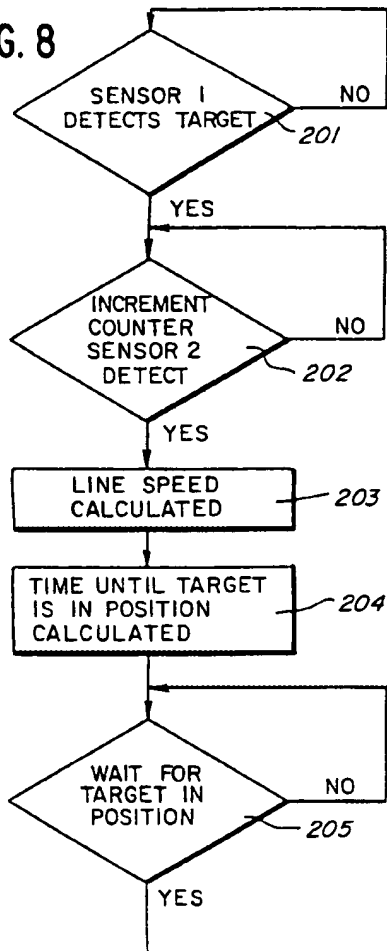
lesdits moyens de commande comprenant des moyens de temporisation fournissant un signal de temporisation en relation avec le moment où au moins l'un desdits récipients qui se déplace arrive audit point d'insertion et des moyens pour actionner lesdits moyens d'entraînement d'approvisionnement en réponse audit signal de temporisation et pour désactiver lesdits moyens d'entraînement d'approvisionnement en réponse audit signal de détection d'un bon.







**FIG. 8**



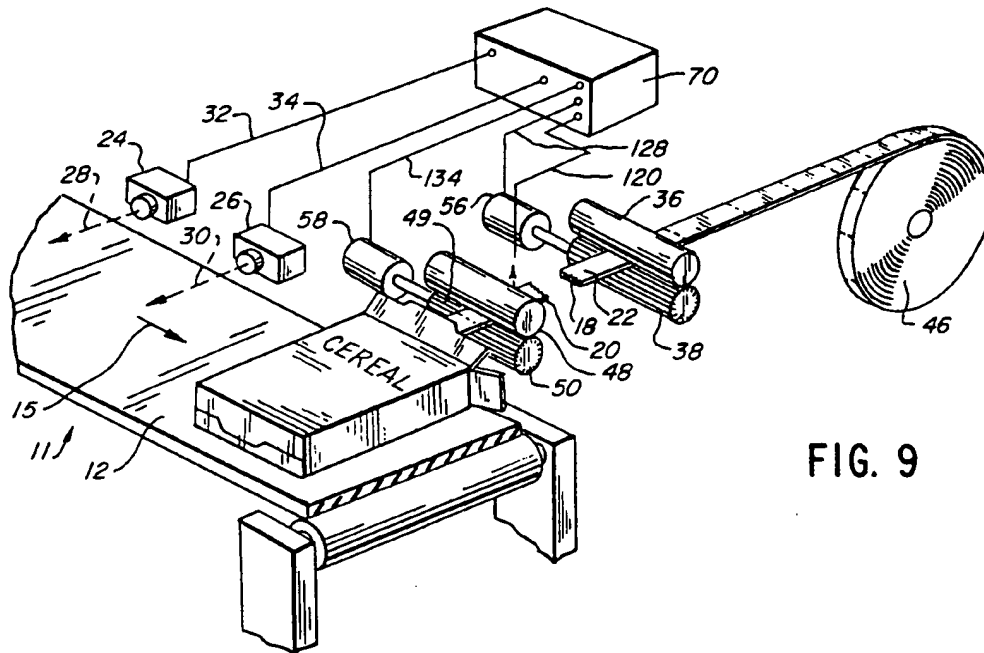


FIG. 9

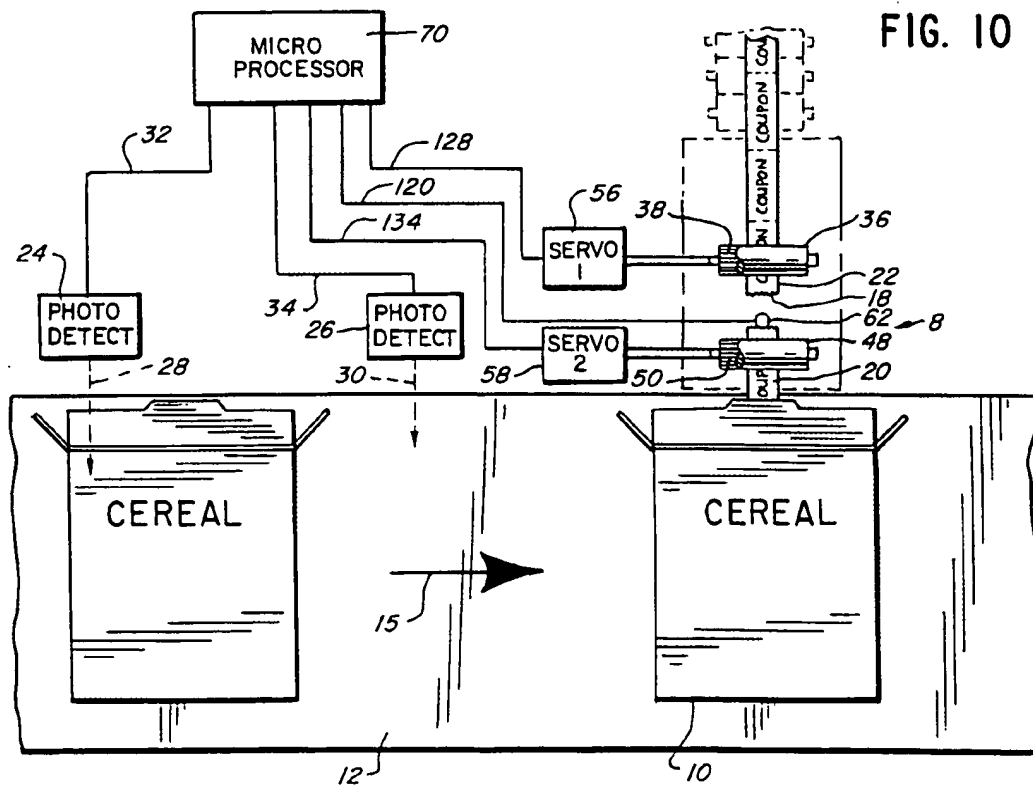


FIG. 10

FIG. 12

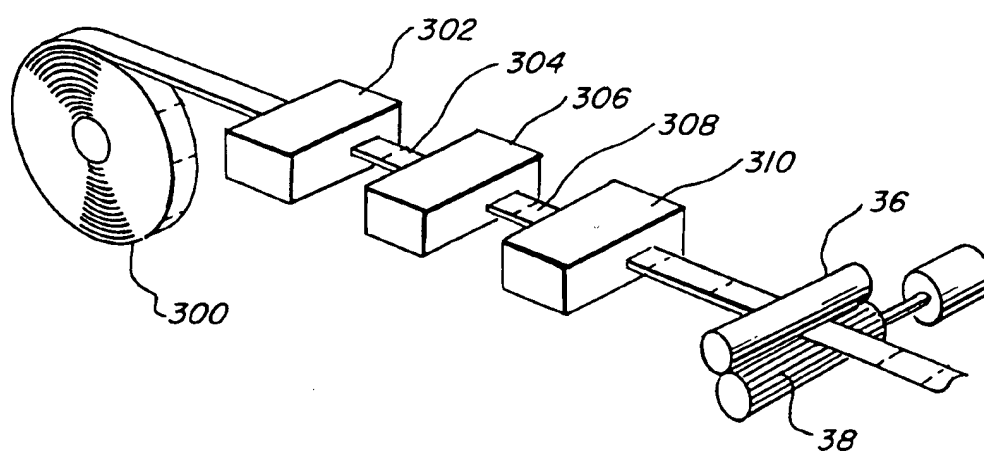
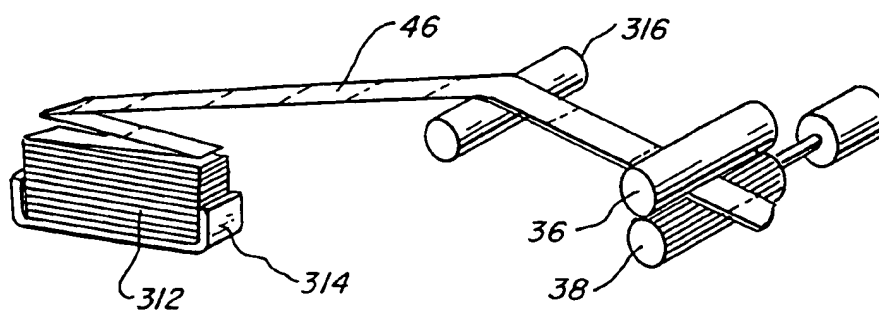


FIG. 11